MIDDLE DEVONIAN GASTROPODS FROM THE BROKEN RIVER PROVINCE, NORTH QUEENSLAND

ALEX G. COOK AND NATALIE CAMILLERI

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Twenty seven taxa of gastropods are described from the Eifelian and Givetian sequences of the Broken River Province, north Queensland with four new genera and ten new species. New taxa are *Denayella lomandraensis* sp. nov., *Gyronema simpsoni* sp. nov., *Frillbeastia queenslandicus* gen. et sp. nov. *Brokenriveria pharlapensis* gen. et sp. nov., *Gemininodosa langi* gen. et sp. nov., *Murchisonia (Murchisonia) wandovalensis* sp. nov., *M. (M.) lawlessi* sp. nov., *Palaeozygopleura dodgeyi* sp. nov., *Australoxa tasselli* gen. et sp. nov. and *Leptogyma queenslandicus* sp. nov. Three gastropod communities are recognised in the Givetian rocks of the province, the *Murchisonia* community, inhabiting a biostromal environment, the *Labrocuspis* community inhabiting high-energy coarse siliciclastic environments and the *Brokenriveria* community inhabiting an open, muddy, carbonate shelf. □ *Gastropods, Givetian, Eifelian, Broken River Province, Queensland.*

Alex G. Cook & Natalie Camilleri, Queensland Museum, PO Box 3300 South Brisbane, 4101, Australia; 1 April 1997.

The Broken River Province, located approximately 200km W of Townsville, north Queensland consists of two subprovinces; Graveyard Creek Subprovince and Camel Creek Subprovince (Withnall & Lang, 1993). The Graveyard Creek Subprovince contains inter alia, a thick, widely-outcropping sequence of Silurian to Middle Devonian, dominantly shallow marine units.

Middle Devonian sequences within the Graveyard Creek Subprovince contain diverse fossil assemblages which have been the subject of intense taxonomic and biostratigraphic study (Jell et al, 1993). Detailed studies of conodonts (Mawson, 1987; Mawson & Talent,1989; Mawson et al., 1988), fish remains (Turner, 1982, 1995; de Pomeroy, 1994) and corals (Wyatt & Jell, 1967) have provided a substantial biostratigraphic database for taxonomic studies within the province. We follow the summary biostratigraphic scheme presented by Jell et al. (1993).

Until now gastropods have remained unstudied within the Broken River Province. Previous work on Devonian gastropods from north Queensland are Etheridge (1917), Heidecker (1959), and Cook (1993, 1995). Gastropod faunas in southeastern Australia have received substantially more attention, more recently through the works of Tassell (1976, 1977, 1978, 1980, 1982).

This paper is concerned with gastropods collected from Eifelian and Givetian units of the Broken River Group, namely the Burges Formation, Dosey Limestone and Papilio Mudstone. Material collected over a number of years by staff at The University of Queensland, Macquarie University and the Queensland Museum contained a small number of gastropods scattered over a large number of localities in the Broken River Province. Subsequent larger collections made by the authors in 1994 and 1995 have revealed a more diverse assemblage. All material is deposited in the Queensland Museum (prefix QMF), and localities are presented in the appendix (QML).

List of Localities. QML541: '*Calceola*' stop 6. 2nd creek upstream from Broken River Gorge, Broken River Province. Burges Formation. Eifelian. Collected P.A. Jell. QML1016: Hill above crossing, S side of river near 'PharLap' prospect, Broken River, near old GSQ camp site. 19°28' S, 144°43'E. Papilio Mudstone, Givetian. Collected A. Cook, N. Camilleri. QML1018: Low rise, 1km S of Storm Dam, 200m W of road at 19°32.92'S, 144°40.51'E. Papilio Mudstone, Givetian. Collected A. Cook, N. Camilleri. QML1019: Ridge of silicified (silcrete)- replaced Dosey Limestone, 100m north of road 500m E of Storm Dam 190. QML1083. Nuggety Gully, E of Gorge-PharLap Rd, basal Papilio Mudstone, just above and adjacent to top of N most Dosey Limestone, 19°27.79'S, 144°44.86'E. Papilio Mudstone, Givetian. Collected A. Cook, N. Camilleri, P Lawless, D. Case, S. Dodgey-Hocknull, P. Dodgey-Tierney, R. Lootsma, 1995: QML1090. Above 'PharLap' crossing on Broken River, N side of River on washed out track approx. 400m NE of QML1016. 19°28.71S, 144°44.05'E,

Papilio Mudstone, Givetian. Collected QM Party 1995. QML1092: 500m NW of type section creek for Dosey & Lomandra Limestones. 150m above Dosey Limestone. 19°29.98'S, 144°43.87'E. Papilio Mudstone, Givetian. Collected QM Party July 1995. A. Cook, P. Lawless, C. McHenry, September 1995. SD21: E side of Dosey Syncline in tributary of Dosey Creek. (see Mawson & Talent, 1989; 221) Papilio Mudstone, Givetian. SD43e: Storm Dam area, Papilio Mudstone, Givetian. SD108: Approx 1.5km NE of Spanner Hill, Papilio Mudstone or Lower Mytton Formation. (see Mawson & Talent 1989: 211) Givetian.

GASTROPOD ASSEMBLAGES

Three Givetian gastropod communities are recognised; *Labrocuspis* community, *Brokenriveria* community and *Murchisonia* community (Table 1), corresponding to differing sedimentologic regimes. The *Labrocuspis* community is found in conglomerates and coarse sandstones interpreted as high energy facies at the basal Papilio Mudstone near 'Nuggetty Gully' area and from similar sandstones in the uppermost Papilio Mudstone or lowermost Mytton Formation in the 'Spanner Hill' area. This occurrence is strikingly similar to the *Burdikinia-Labrocuspis-Austerum* faunule noted by Cook (1993), which occurs in high energy nearshore facies of the Big Bend Arkose (Givetian, Burdein Subprovince).

Brokenriveria community occurs within carbonate mudstone facies of the Papilio Formation, interpreted as shallow, low energy, open marine, impure carbonate shelf. *Murchisonia* community is derived from within the uppermost Dosey Limestone and is associated with corals, stromatoporoids, sponges from a biostromal environment.

Eifelian gastropods are insufficiently represented in the collected fauna to comment on their commmunity arrangement.

FAUNAL AFFINITIES

Comment has already been made on the similarity of *Labrocuspis* community in the Burdekin Subprovince and the Broken River Province. In both are also found the bivalve *Tanaodon louderbacki*, which is also known from the Givetian of Guangxi (Pojeta et al., 1985). The presence of *Murchisonia* species, *Soleniscus*, palaeozygopleurids and *Platyceras* suggests affinity with Old World Realm faunas, but sufficiently removed to develop distinct endemism at the species level. There are, however closely related species of *Brokenriveria* gen. nov. and possibly *Frillbeastia* gen. nov. known from Germany as argued below. There are other generic level affinities with Eifelian faunas in Nevada (Blodgett, 1992) and Alaska (Blodgett & Johnston, 1992) and Givetian faunas in Yunnan (Mansuy, 1912), Guangxi (Wei & Pan, 1988). Taxonomic hangovers from southeastern Australian faunas of Emsian age are evidenced by the co-occurence of *Mitchellia, Leptogyma*, and *Murchisonia (M.)* sp. cf. *M. (M.) fermioni* Tassell. A dearth of taxonomic work on southeast Asian and Russian gastropods of Middle Devonian age makes conclusive assessment of the taxonomic affinities impossible.

TABLE 1. Constituent taxa of Givetian gastropod communities. r = rare, c = common, a = abundant, s = single occurrence.

Species	*Murchisonia* community	*Labrocuspis* community	Brokenriveria community
Bellerophon (Bellerophon) sp. A.			s
Bellerophon (Bellerophon) sp. B.			s
Straparollus (Straparollus) sp.	s		
Straparollus (Euomphalus) sp. A	r		
Straparollus (Euomphalus) sp. B	s		
Labrocuspis nodosa Heidecker		r	
Omphaoltrochid indet.	s		
Denayella lomandraensis sp. nov.			r
Frillbeastia queenslandicus gen. et. sp. nov.	r		
Brokenriveria pharlapensis sp. nov.			a
Gemininodosa langi gen. et sp. nov.			a
Platyceras (Platyceras) sp.			s
platyceratoid indet.			s
Burdikinia burdekinensis (Etheridge)		r	
Murchisonia (Murchisonia) wandovalensis sp. nov.			c
Murchisonia (Murchisonia) lawlessi sp. nov.	c		
Muchisonia (M.) sp. cf. *M. (M.) fermioni* Tassell	c		
Murchisonia (M.) sp.	s		
murchisoniid indet.	r		
Stylonema? sp.	s		
Australoxa tasselli gen. et sp. nov.			r
Palaeozygopleura dodgeyi sp. nov.			r
Soleniscus sp. cf. *S. subcostata* Schlotheim	r		
Leptogyma queenslandicus sp. nov.			c
Mitchellia striatula de Koninck			s

SYSTEMATIC PALAEONTOLOGY

Class GASTROPODA Cuvier, 1797
Order ARCHAEOGASTROPODA Thiele, 1925
Superfamily BELLEROPHONTOIDEA M'Coy, 1851
Family BELLEROPHONTIDAE M'Coy, 1851
Bellerophon Montfort, 1808
Belleropohon (Bellerophon) Montfort, 1808

Bellerophon (Bellerophon) sp. A.
(Fig. 1A, B)

MATERIAL EXAMINED. QMF32642 from SD21. QMF32644 from QML1018.

DESCRIPTION. Medium-sized, isostrophic shell, up to 20mm wide and 20mm diameter; doubly phaneromphalous. Whorl profile gently rounded, with a weak ridge mid-whorl Smooth, fine, growth lines, nearly straight; shell rapidly expanding; lip and aperture unknown.

REMARKS. Poor preservation of this material does not allow confident specific assignment to one of the many species of *Bellerophon (Bellerophon)*. It is assigned to this subgenus on the basis of the rounded whorl profile, absence of spiral ornament and simplicity of growth lines.

Bellerophon (Bellerophon) sp. B
(Fig. 1C, D)

MATERIAL EXAMINED. QMF33621 from QML1092.

DESCRIPTION. Small, isostrophic shell, 10mm wide, 10mm diameter; rapidly expanding, aperture flared. Selenizone, prominent upon weak ridge. No growth lines preserved.

REMARKS. The single, poorly preserved specimen cannot be assigned to a species. It is more rapidly expanding and smaller than *Bellerophon (Bellerophon)* sp. A.

Superfamily EUOMPHALOIDEA de Koninck, 1881
Family EUOMPHALIDAE de Koninck, 1881
Straparollus de Montfort, 1810
Straparollus (Straparollus) de Montfort, 1810

Straparollus (Straparollus) sp.
(Fig. 1E, F)

MATERIAL EXAMINED. QMF33103 from QML1019.

DESCRIPTION. Medium-sized, trochifrom shell, approximately 5.5mm high, 10mm wide; apical angle approximately 110°, sutures strongly impressed. Whorl profile strongly rounded with slight shoulder. Ornament consists of numerous fine growth lines, slightly prosocline. There is a very slight flexure in the growth lines on the weak shoulder suggesting the sinus. Just below mid-whorl near the aperture, there is an apparent shell repair.

REMARKS. The specimen is confidently assigned to the subgenus on the basis of the whorl profile, overall shape and ornament. The number of species of this subgenus is large and confident assigment to speeies is unwise due to the lack of material, and the degree of variation present in known taxa (Linsley & Yochelson, 1973). The specimen differs from *S.(S.) ater* (Spitz) of Jhaveri (1969) from the lower Devonian of the Carnic Alps, which is much more squat. *S. (S.) kokeni* (Spitz) of Jhaveri (1969) has a much more prominent shoulder. Of the taxa described by Linsley & Yochelson (1973), *S. (S.) laevis* (Archiac & Verneuil), from the Middle Devonian of Germany, is more flattened, but their *S. (S.) ?laevis* is more resemblant of the Broken River specimen. *S.(S.) cyclostomus* (Hall) of Linsley & Yochelson (1973) from the Middle Devonian of North America has a more prominent sinus.

Straparollus (Euomphalus) Sowerby, 1814

Straparollus (Euomphalus) sp. A
(Fig. 1G)

MATERIAL EXAMINED. QMF33104, QMF33352 from L1019.

DESCRIPTION. Small, planispiral shell up to 12mm in diameter, 4mm maximum height. Both specimens are preserved as basal moulds. Whorl profile subrounded to subquadrate, with a weak angulation between the midwhorl and basal surfaces obvious in the last whorl. No obvious growth lines preserved, but there is a faint hint of fine collabral lines on QMF33104. Protoconch unknown.

REMARKS. This material cannot be identified further due to inadequate preservation.

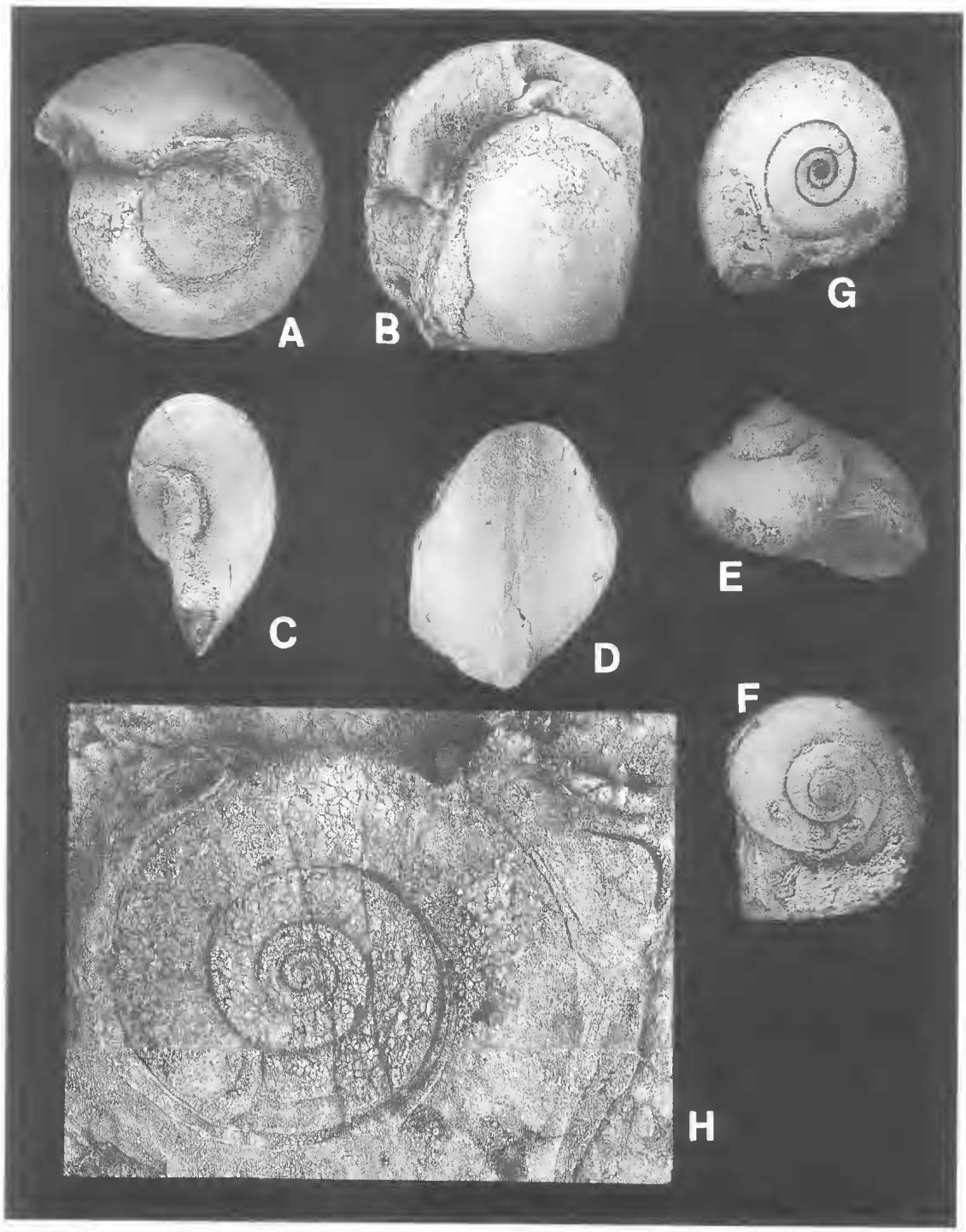

FIG. 1. A,B, *Bellerophon (Bellerophon)* sp. A., QMF32642 x 2.2. A, side view; B, apertural view. C,D, *Bellerophon (Bellerophon)* sp. B, QMF33621 x 2.7. C, side view; D, view of selenizone. E,F, *Straparollus (Straparollus)* sp., latex moulds from QMF34267 x 3.1. E, apertural view; F, apical view. G, *Straparollus (Euomphalus)* sp. A, QMF33352 x 3.1, basal view. H, *Straparollus (Euomphalus)* sp. B, QMF34752 x 2.2. All specimens (and those on subsequent figures) whitened with ammonium chloride for photography.

Straparollus (Euomphalus) sp. B.
(Fig. 1H)

MATERIAL EXAMINED. QMF34752 from QML1018.

DESCRIPTION. Large, planispiral, 42mm in diameter; 4 whorls preserved in cross section and external mould, the first 2 preserved whorls are septate; septa gently concave; collabral growth lines preserved on the final whorl are fine and numerous.

REMARKS. The planispiral form, simplicity of growth lines and the septation identifies the subgenus, but a species cannot be assigned.

Family OMPHALOTROCHIDAE
Knight, 1945

Labrocuspis Heidecker,1959

Labrocuspis Heidecker, 1959: 6; Kase,1989:149.

TYPE SPECIES. *Labrocuspis nodosa* Heidecker, 1959, by original designation, from the Middle Devonian (?late Eifelian- Givetian), Big Bend Arkose, north Queensland.

DIAGNOSIS. Large, anomphalous trochiform gastropod; suture deep and impressed, whorl profile rises from the suture to a keel and descends to a variably developed peripheral buttress.

REMARKS. *Labrocuspis* is presently restricted to two taxa; the type and *L. kobayashii* (Kase & Nishida, 1988), from the Eifelian Nakazato Formation, north east Japan. Kase (1989) assigned the genus to Omphalotrochidae. Heidecker (1959) remarked on the differential development of the peipheral buttress, it only being fully expressed in larger forms.

Occurrences of the genus recorded by Heidecker (1959), Kase (1989) and Cook (1993) highlight association of this genus with neashore to shoreline, often high energy siliciclastic deposition. Cook (1993) suggested strong ecological control for the genus within the Big Bend Arkose and Burdekin Formation. Material here described is from coarse-grained siliciclastic units, including conglomerates and very coarse to granular sandstones which display cross and planar lamination. Thus a high-energy shallow water environment is suggested.

Labrocuspis nodosa Heidecker, 1959.
(Fig. 2A-C)

Labrocuspis nodosa Heidecker, 1959: 6, Pl. 1 fig. 2a-d, Pl. 3, fig. 2a-b.

MATERIAL EXAMINED. QMF16547, QMF33316 locality imprecise, Broken River Province, collected M. Wade. QMF33315 from SD108, Upper Papilio Formation or Mytton Formation, collected J. Jell. QMF33582 from QML1089; QMF33580, QMF33581, QMF33583 from QML1083. There is some doubt as to the exact origin of specimens QMF16547, QMF33315 and QMF33316. All were collected at the same time, with J. Jell (pers. comm.) recording the origin as Locality SD108, within the Papilio Formation. However the coarser grained lithology would suggest the nearby outcrops of Mytton Formation.

DISTRIBUTION. Middle Devonian (?late Eifelian- Givetian), north Queensland. The species is apparently endemic to the region. Very poorly preserved material from the Laroona Formation, Burdekin Subprovince may belong to this taxon, which would extend the age range to the Emsian.

DESCRIPTION. Moderately large, thick-shelled, dextrally-coiled, trochiform gastropod up to 63mm high and 36mm wide, with an apical angle up to 120°; suture deep and impressed; sutural slope approximately 10°. Whorl profile rises sharply from the suture to a gently rounded carina, and slopes to a very gently convex profile. Upper whorl profile is gently convex, but breaks midwhorl to produce a gently concave profile below the midwhorl producing a buttress on the lowermost surface. The carina is conspicuously nodose particularly in final whorls. Base flat, with a wide callus pad. Aperture quadrate. Growth lines preserved on base, none preserved on whorl surface.

REMARKS. *Labrocuspis nodosa* was only previously recorded in the nearby Burdekin Subprovince, Givetian, north Queensland (Heidecker, 1959). The Broken River material is relatively poorly preserved but is inseparable from *L. nodosa* Heidecker from the Big Bend Arkose and Burdekin Formation, having the nodose carina, variable development of the buttress, and strongly developed callus pad. It differs from *L. kobayashii* (Kase & Nishida) in the degree of sutural impression, the nodose carina, and hence the upper whorl profile.

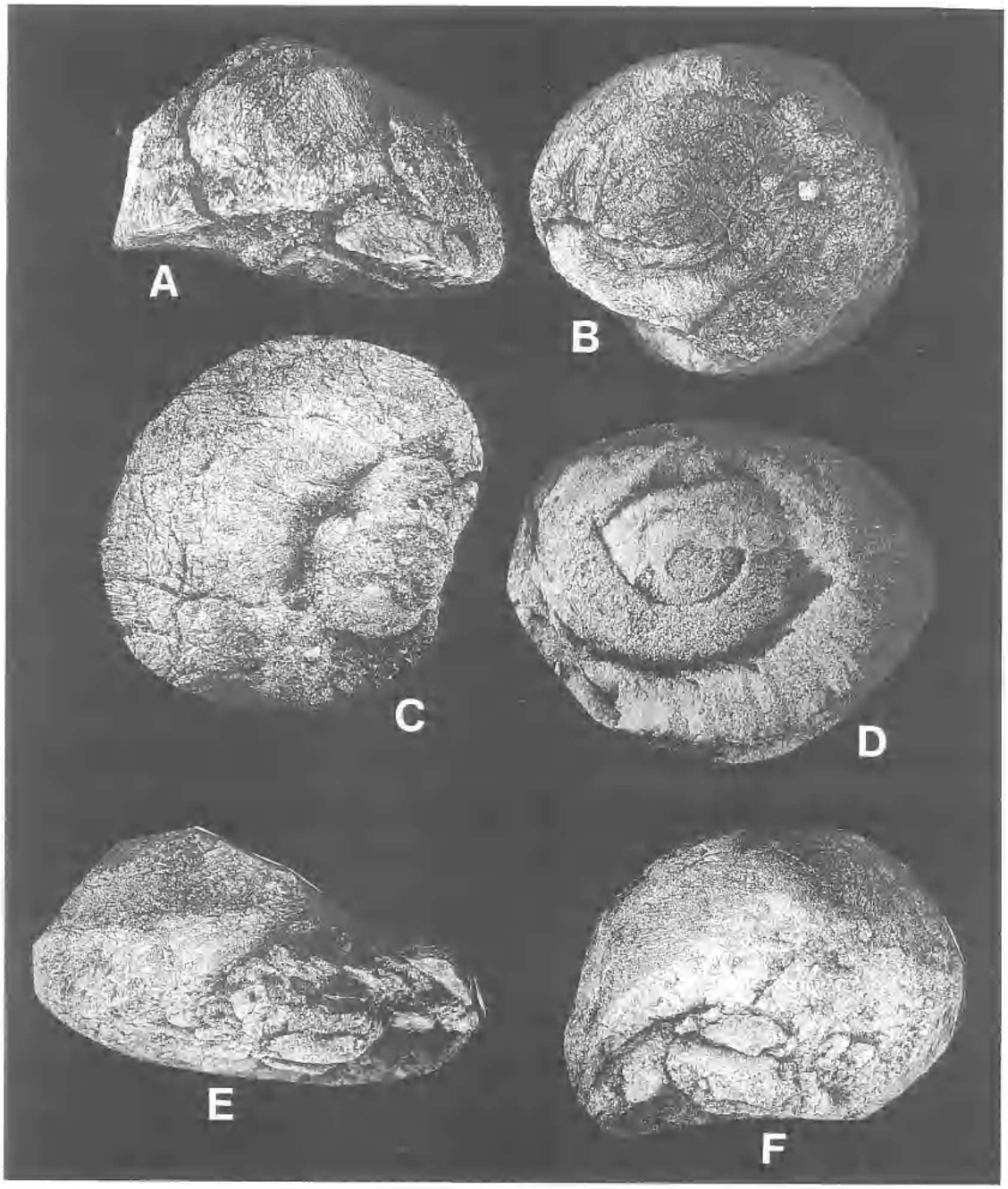

FIG. 2. A-C, *Labrocuspis nodosa* Heidecker, 1959, QMF33583 x 1, apertural, apical and basal views respectively. D, Omphalotrochid indet., latex mould from QMF33687 x 2, apical view. E,F, *Burdkininia burdekininnsis* (Etheridge, 1917), QMF33579 x 2. E, apertural view. F, apical view.

Omphalotrochid indet.
(Fig. 2D)

MATERIAL EXAMINED. QMF33687 from QML1019.

DESCRIPTION. Mould of an upper surface of a large, shallowly trochiform shell, 25mm in diameter. Apical angle apporximately 140°. Suture deep, impressed forming a channel in last whorl. Growth lines fine, collabral.

REMARKS. The specimen superficially resembles *Orecopia murrayi* Tassell, 1978 from the Lower Devonian Bell Point Limestone, Victoria, but cannot be confidently assigned to a genus as no basal structures are known. The specimen lacks the nodose carina of *Labrocuspis nodosa* Heidecker. The specimen is left in open nomenclature pending more material.

Superfamily PLEUROTOMARIOIDEA
Swainson, 1840
Family RAPHISTOMATIDAE Koken, 1896
Subfamily RAPHISTOMATINAE Koken, 1896

Denayella Blodgett & Johnson, 1992

TYPE SPECIES. *Denayella housei* Blodgett & Johnson, 1992, from the Eifelian Denay Limestone of Nevada, U.S.A.

Denayella lomandraensis sp. nov.
(Fig. 3 A,B)

MATERIAL EXAMINED. HOLOTYPE: QMF33650 from QML1092, Papilio Mudstone, Givetian, Broken River Province. PARATYPES: QMF33651-33672, QMF34215-34222 from QML1092, QMF33619 from QML1090.

DIAGNOSIS. Small member of genus with flattenedbase and weak inductural deposit.

DESCRIPTION. Small (Table 2) lenticular, anomphalus. Whorl profile sharply rounded, upper surface gently sloping, lower surface steeper. Periphery on upper 1/3 of whorl profile, sharply rounded bearing 2 indistinct cords delimiting a probable selenizone, within which the lunulae are not preserved. Lower cord is more obscure than the upper and on many specimens they are not preserved due to abrasion. Aperture rhomboid to subrounded, with a v-shaped sinus on the labrum. Shell thick especially at columella. There is a distinct thickening of shell on the columella. Base convex, but not sharply so. Very weak, fine, collabral growth lines, otherwise surface smooth and unornamented.

TABLE 2. Measurments for *Denayella lomandraensis* sp. nov.

Specimen	height (mm)	width (mm)
QMF33650	4.3	7.0
QMF33651	4.3	6.7
QMF33652	3.3	6.1
QMF33655	4.1	7.4

REMARKS. The material is placed in *Denayella* due to its raphistomid-like appearance, indistinct, but present, seleneizone and weak inductural deposit on the columellar lip. It differs from the type species in having a more flattened base and a weaker deposit on the columellar lip. It is more similar to *Denayella* sp. of Blodgett & Johnson, 1992 with respect to the flatter base. The species differs from members of *Arizonella* Stoyanow, 1948 by its lack of a prominent selenizone, and well developed collabral ornament. It differs from *Buchelia* and *Raphistoma* due to the lack of cords on the upper whorl face. *Umbotropis mesoni* Tassell 1982, from the *Receptacutites* Limestone of New South Wales is clearly phaneromphalus, and has more prominent spiral cords on the upper whorl face rather than the periphery.

ETYMOLOGY. For Lomandra Creek.

Subfamily LIOSPIRINAE Knight, 1956

Frillbeastia gen. nov.

DIAGNOSIS. Small, trochiform with flattened base; angular periphery with selenizone bounded below by frilled carina; upper whorl face with 2 strong threads, the lowermost of which is nodose; strong prosocline ornament; planispiral protoconch.

TYPE SPECIES. *Frillbeastia queenslandicus* sp. nov.

DISTRIBUTION. Middle Devonian (Givetian), uppermost Dosey Limestone, Broken River Province, north Queensland, ?Middle Devonian (Givetian), Germany (Sandberger & Sandberger, 1850-6).

REMARKS. The genus is similar to *Arastra* Stoyanow, 1948 from the early Late Devonian in Arizona, having a distinct frill, but is less lenticular in shape, possesses stronger collabral ornament, strong spiral cords with nodes, and the

protoconch is planispiral. Superficially similar is *Astralites* Whiteaves, 1892 from the Middle Devonian of Canada, which lacks the prominent selenizone and spiral ornament. Members of the Luciellidae Knight, 1956 such as *Luciella* de Koninck, 1883 and *Epiptychia* Perner 1907 have the frill above the selenizone, rather than below in Liospirinae. *Zalozone* Linsley, 1968 possesses a double frilled selenizone, and *Tylozone* Linsley, 1968 has a selenizone bordered by an upper frill. *Frillbeastia* is placed in Liospirinae due to closer similarity to *Arastra*, but is by far the most trochiform member of the subfamily. Linsley (1968) placed *Arastra* within the Raphiostomatinae, with *Zalozone*. The base of *Frillbeastia* is wide and hence is retained in Liospirinae with the wide-based *Arastra*.

Within the genus could be included *Littorina alata* Sandberger & Sandberger, 1850-1856 from the Middle Devonian (Givetian) of Germany. The taxon illustrated (Sandberger & Sandberger, 1850-56: pl. 24: fig. 14) shows the characteristic frilled keel, a similar base, and numerous cords on the upper surface. It differs from *F. queenslandicus* by having numerous equal strength cords, it lacks the strong growth lines and the nodose cord above the selenizone which is not identifiable on the illustrations of the German taxon.

ETYMOLOGY. For the informal name given in the field, reflecting the character of the selenizone.

Frillbeastia queenslandicus sp. nov.
(Fig. 3C-G)

MATERIAL EXAMINED. HOLOTYPE: QMF33687, from QML1019 uppermost Dosey Limestone Givetian, Broken River Province. PARATYPES: QMF33695, QMF34265 from QML1019.

DIAGNOSIS. As for genus.

DESCRIPTION. Small, trochiform, nearly conical shell, complete specimen is 16mm wide, 11mm high with a spire angle of approximately 60°. Base flattened, bearing spiral cord, narrowly phaneromphalus or anomphalous. Whorl face ornate and angular with suture just below frill on midwhorl. Upper whorl face possesses 2 major threads, 1 close to the periphery, and another weaker thread on the mid-upper whorl face. These increase in strength throughout growth. The lowermost thread possesses stout rounded nodes, the upper thread has vestigal nodes preserved on the holotype. The angular shell periphery is decorated by a simple, fine spiral thread which is the upper boundary for the selenizone. Below the selenizone is bordered by a rhythmically folded carina, thus producing a frill. The lower whorl profile possesses a single thread, slightly nodose. Collabral ornament is prosocline. Protoconch nearly planispiral, 2-3 whorls with simple comarginal ornament; a vestige of a selenizone is recognisable on the 3rd whorl.

REMARKS. Despite the small number of specimens the material is signficantly distinct to warrant erection of a new genus. One of the specimens has less distinct nodes and cords on the upper whorl face, and shows signs of abrasion.

ETYMOLOGY. For the state of Queensland.

Suborder TROCHINA Cox & Knight,1960
Superfamily PLATYCERATOIDEA Hall, 1859
Family HOLOPEIDAE Wenz, 1938
Subfamily GYRONEMATINAE Knight, 1956

Gyronema Ulrich in Ulrich & Scofield, 1897

TYPE SPECIES. *Trochonema (Gyronema) pulchellum* Ulrich and Scofield, 1897 from the Middle Ordovician, Minnesota, United States of America.

DIAGNOSIS. See Knight et al. (1960).

Gyronema simpsoni sp. nov.
(Fig. 4C,D)

MATERIAL EXAMINED. HOLOTYPE: QMF32082 from QML541, Burges Formation, Eifelian, Broken River Province. PARATYPES: QMF32055, QMF32058 from QML541.

DIAGNOSIS. Very large *Gyronema* with characteristic thickened spiral cords, flattened uppermost whorl surface forming a low shoulder, 2 prominent cords on upper whorl surface, the highest being an angular carina, 6 prominent cords on final whorl.

DESCRIPTION. Large, turbiniform, narrowly phaneromphalus gastropod, with prominent thick spiral ornament and impressed sutures. Shell height up to 47mm, and width up to 32mm, with an apical angle of approximately 20°. External whorl profile is dominated by spiral cords, the uppermost forming a prominent angular carina high on the whorl profile which is divided into two surfaces. Uppermost third of the whorl profile is a gently concave shoulder, which slopes shallowly from the suture to the carina; mid whorl is nearly vertical, and the lower whorl profile gently convex with both marked by thick spiral cords. Sutures formed at midwhorl, slightly

above the 3rd spiral cord, thus obscuring all but 2 uppermost cords on early whorls. Aperture generally rounded, slightly vertically extended with abaxial angulation above midwhorl. Growth lines unknown. The 2 paratypes are somewhat crushed and distorted, but retain the characteristic spiral cords.

REMARKS. Material has the typical form of the genus, but differs from the type species by the more flattened shoulder, in addition this taxon is several times larger than the genotype figured by Knight (1941). In size and form this species is comparable to *G. bellense* of Tassell from the Early Devonian of Victoria but *G. bellense* has far more numerous spiral cords. *G. lirata* (Hall) of Rollins, Eldredge & Spiller (1971), from the Middle Devonian Marcellus Formation, New York is smaller (17mm high), with more spiral cords on the upper whorl surface, however it does possess a similar shoulder to *G. simpsoni*. *Gyronema scaliforme* Zytlenok, 1976 from the Devonian of Belorus' possesses more cords than the Broken River species. The species is close to *G. ormistoni* Blodgett, 1992 from the Eifelian of Alaska, but lacks the prominent basal cords of that taxon.

ETYMOLOGY. For Andrew Simpson.

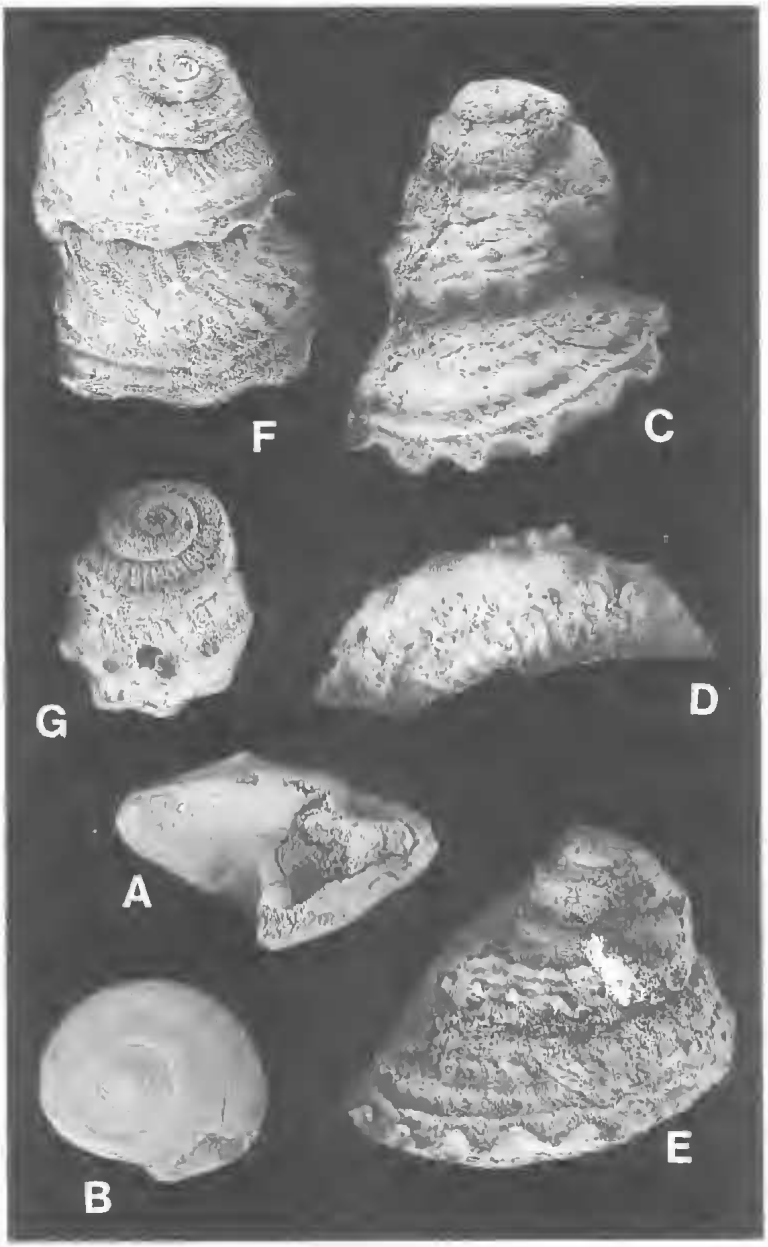

FIG. 3. A,B, *Denayella lomandraensis* sp. nov., Holotype QMF33650 x 6. A, apertural view; B, apical view. C-G, *Frillbeastia queenslandicus* gen. et sp. nov. C-E, latex mould of Holotype QMF33687 x 3.6. C, oblique side view; D, basal view; E, side view. F, latex mould of Paratype QMF34265, x 3.1, side view. G, latex mould of Paratype QMF33695, x 4.5, oblique view showing protoconch.

Brokenriveria gen. nov.

TYPE SPECIES. *Brokenriveria pharlapensis* sp. nov.

DIAGNOSIS. Small turbiniform gyronematid with 2 orders of nodose spiral cords.

DISTRIBUTION. Middle Devonian (Givetian) Papilio Mudstone, Broken River Province, north Queensland, Middle Devonian, Rhineland (Goldfuss, 1844).

REMARKS. Lack of a selenezone precludes assignment of this material to grossly similar genera

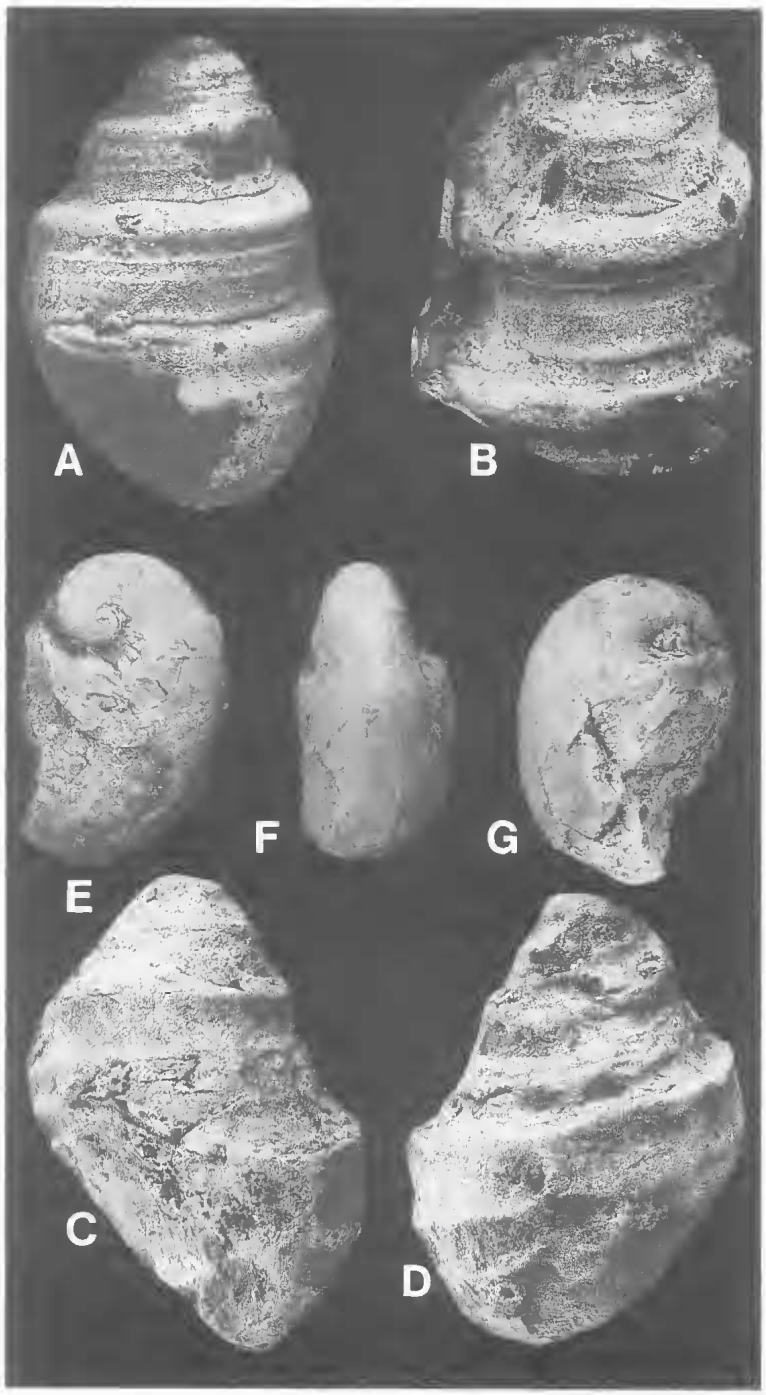

FIG. 4. A,B. Murchisoniid indet. A, latex mould of QMF33100, side view x 1.8. B, latex mould of QMF34259, oblique side view x 2.7. C, D. *Gyronema simpsoni* sp. nov. Holotype QMF32082, x 1.3. C, apertural view; D, side view. E-G, *Platyceras (Platyceras)* sp. QMF32641, x 2.7. E, apical view; F, side view; G, basal view.

Bembexia Oehlert, *Nodonema* Linsley, or other Pleurotomarioidea. The prosocline growth lines across the shell, the strong cords and the thicker shell suggest that this material can be accommodated within the Gyronematidae. The genus differs from other gyronematids in the possession of two orders of spiral cord, rather than one on *Yunnania* Mansuy, and *Gyronema* Ulrich. Robert Blodgett (pers. comm) has kindly drawn my attention to a similarly ornamented taxon *Turbo caelatus* Goldfuss, 1844 from the Middle Devonian of Germany, which should be included in the genus, but differs in the number of cords on the upper whorl face.

ETYMOLOGY. For the Broken River.

Brokenriveria pharlapensis sp. nov. (Fig. 5)

MATERIAL EXAMINED. HOLOTYPE: QMF32234 from QML1016, Papilio Mudstone, Givetian, Broken River Province. PARATYPES: QMF32235-32301 from QML1016.

DIAGNOSIS. As for genus.

DESCRIPTION. Small to medium-sized, turbiniform gastropod, up to 17mm high and wide (Table 3) with an apical angle of approximately 105°. Whorl profile rounded, but dominated by two orders of numerous nodose spiral cords. Suture impressed, whorls embrace at the midwhorl. Periphery situated at midwhorl. Six major threads on the whorl surface, 1 on the upper whorl face, another at midwhorl, the remainder on the lower whorl face. Major cords are interspaced with 1 less prominent nodose spiral thread, with the exception of the uppermost

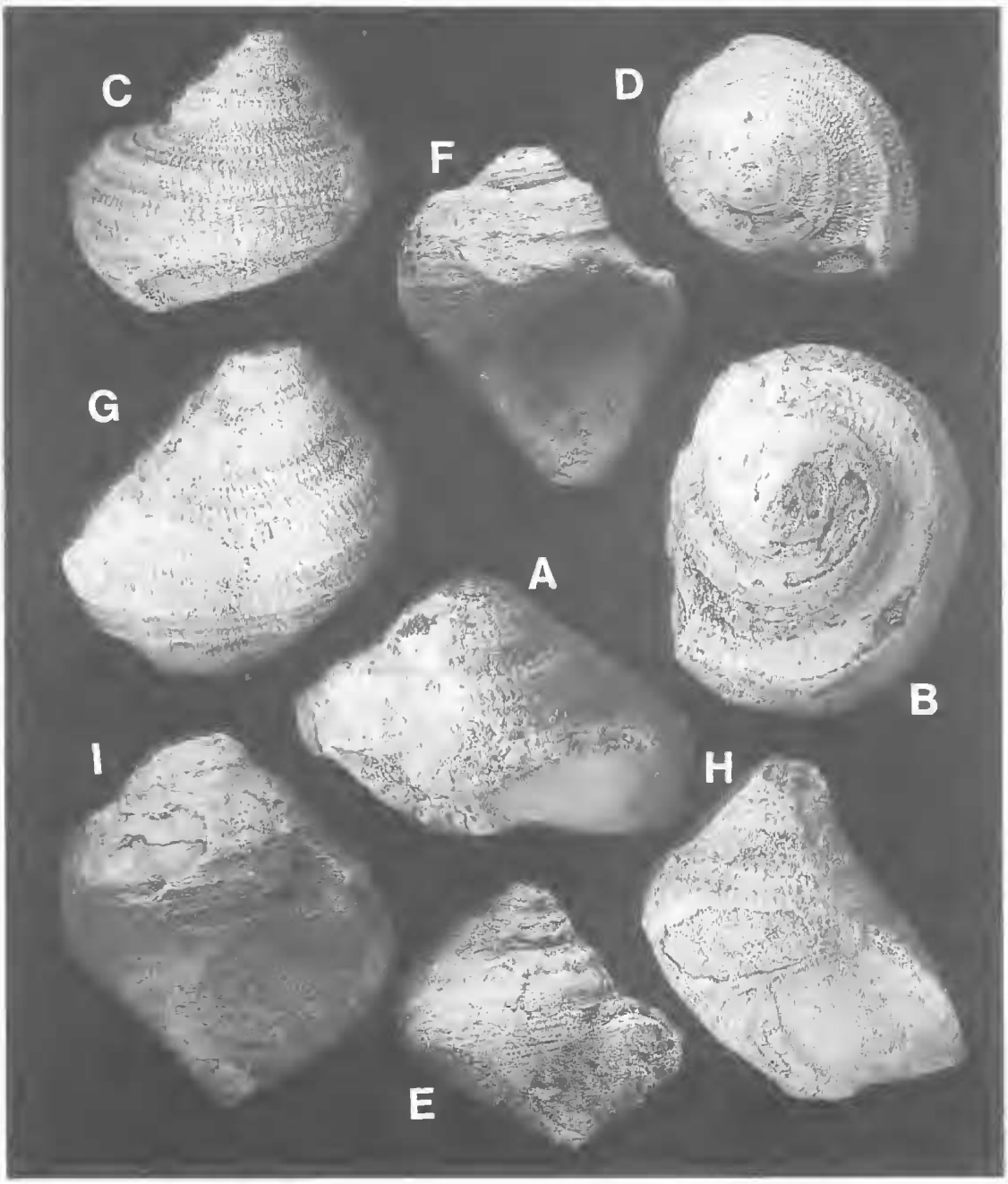

FIG. 5. *Brokenriveria pharlapensis* sp. nov. A, B, Holotype QMF32234, x 3. A, apertural view; B, apical view. C-E, paratype, QMF32268, x 2.8. C, side view. D, apical view. E, apertural view. F, QMF32273, x 2.8, apertural view. G, H. Paratype QMF32272, x 2.7. G, side view; H, apertural view. I, paratype QMF32274, apertural view x 2.8.

major thread which has 2 minor threads between it and the suture. Growth lines of 2 orders; numerous, fine, prosocline, slightly coarser growth lines intesect with spiral cords to produce nodes. Aperture rounded, outer lip not preserved, inner lip thickened, and in some specimens reflected slightly. Shell relatively thickened for size. Protoconch unknown.

TABLE 3. Measurements for *Brokenriveria pharlapensis* sp. nov.

Specimen	height (mm)	width(mm)	approx. apical angle (°)
QMF32234	11.7	14.6	70
QMF32237	12.7	11.2	70
QMF32239	12.7	14.0	70
QMF32272	13.8	14.3	70
QMF32296	14.0	13.5	65
QMF33625	12.4	12.5	75
QMF33629	16.0	13.5	65
QMF33628	15.2	13.2	75
QMF33636	13.1	10.0	65

REMARKS. This species differs from *Gemininodosa langi* sp. nov. by its lack of very large nodes on the shell periphery. The specimen of indeterminite platyceratoid described below has a more rounded whorl profile, greater expansion rate and less prominent spiral ornament.

ETYMOLOGY. For 'Pharlap' Crossing of the Broken River.

Gemininodosa gen. nov.

TYPE SPECIES. *Gemininodosa langi* sp. nov. from the Middle Devonian Papilio Mudstone, Broken River Province, north Queensland.

DIAGNOSIS. Small to medium-sized, turbiniform, minutely phaneromphalus, with numerous spiral cords; upper whorl surface bears 2 spiral rows of large rounded nodes.

REMARKS. The lack of a sinus or selenizone, dominance of spiral ornament and the turbiniform shape indicates placement within the Holopeidae Wenz. Superficially the genus is like *Oriostoma* Munier-Chalmas but does not possess the wide umbilicus. The distinct nodose ornament renders the genus unlike any other members of the family but is reminiscent of the node- (and selenizone-) bearing Pleurotomariitoidea, such as *Nodonema* Linsley, 1968 and *Glyptomaria* Knight, 1945.

ETYMOLOGY. For the twin nodes adorning the shell.

Gemininodosa langi gen. et. sp. nov.
(Fig. 6A-I)

MATERIAL EXAMINED. HOLOTYPE: QMF33611 from QML1092, Papilio Mudstone, Givetian, Broken River Province. PARATYPES: QMF33608-33610, QMF33612-33618, from QML1092, QML33638-33644 from QML1090.

DIAGNOSIS. As for genus.

DESCRIPTION. Medium-sized, turbiniform, minutely phaneromphalus, up to 16mm wide and 16mm high (Table 4) with an average spire angle of 75-115°. Sutures impressed, whorls embrace at midwhorl. Whorl profile overall rounded, flattened adjacent to the suture, rounded at midwhorl and lower whorl surface. Midwhorl dominated by 2 rows of large nodes, one at the edge of the flattened upper whorl surface the other near the periphery. A third less distinct set of nodes occurs below the midwhorl. Whorl surfaces are ornamented with many spiral cords, with at least 5 major cords on the lower whorl surface, 4 on the mid whorl, and 3 on the upper whorl surface. Growth lines fine, numerous and opisthocline; continuing across the midwhorl undeflected by any selenizone. Protoconch unknown.

REMARKS. This species differs from *Brokenriveria pharlapensis* and the indeterminite platyceratoid described below by possessing the twin row of nodes on the upper surface. The grossly similar *Nodonema granulatum* Linsley from the Middle Devonian Anderdon Limestone, is much smaller (holotype 6mm high), and possesses a distinct selenizone. *Kitikamispira ukalundensis* Cook, 1995, from the Emsian Ukalunda Beds of Queensland, and *Kitikamispira kanekoi* Kase & Nishida, 1988 from the Eifelian, Nakazato Formation, Japan both have nodes on all the spiral cords, and these spiral cords are strong and of equal intensity.

ETYMOLOGY. For Simon Lang.

Family PLATYCERATIDAE Hall, 1859
Platyceras Conrad, 1840

Platyceras (Platyceras) Conrad, 1840

TYPE SPECIES. *Pileopsis vetusta*, from the Lower Carboniferous of Queens County, Ireland by subsequent designation of Tate (1869).

Platyceras (Platyceras) sp.
(Fig. 4E-G)

MATERIAL EXAMINED. QMF32641, from SD43e.

DESCRIPTION. Small, horn-shaped rapidly expanding shell, 5.1mm high, 11.5mm maximum width; first whorl in contact, second disjunct; whorl profile ovate, aperture broken, but basal lip deflected strongly downwards near apertural

margin. Ornament consists of fine, faint collabral growth lines and diffuse coarser growth rugae.

REMARKS. Substantial variation in members of the subgenus render it unwise to nominate a species on the basis of a single specimen. *Platyceras (P.)* sp. A. of Tassell (1982) from the Early Devonian of Taemas has more disjunct whorls whereas the Broken River specimen has the first whorl in contact. *Platyceras (P.) mansfieldense* Tassell, 1977 from the Early Devonian Loyola Limestone has similar ornament and has the first whorl in contact, but is a significantly larger form.

PLATYCERATOIDEA gen. et sp. indet.
(Fig. 6J,K)

MATERIAL EXAMINED. QMF34224 from QML1092.

DESCRIPTION. Turbiniform, medium-sized, 13mm high and 13mm wide, average spire angle approximately 110°. Sutures impressed, with whorls embracing slightly above midwhorl. Whorl profile rounded. Ornament consists of numerous spiral cords of equal strength, and fine weaker, slightly prosocline collabral growth lines.

REMARKS. The single distinct specimen lacks the two orders of spiral threads characteristic of *Brokenriveria pharlapensis* and does not bear the twin cords of *Gemininodosa langi*. The turbiniform, shape, lack of sinus and simple ornament places the specimen in the superfamily, and it is possibly a platyceratid, but further assignment is impossible without a wider selection of material.

Superfamily and Family indet.
Burdikinia Knight, 1937

Burdikinia burdekinensis (Etheridge, 1917)
(Fig. 2E,F)

Polyamma burdekeninesis 1917 Etheridge: 16; Pl. 3 figs 1,2.
Burdikinia burdekinesis (Etheridge) Knight 1937: 711 (Etheridge) Knight 1941: 63; Pl. 57, figs 3a-b ; Heidecker, 1959: 5, Pl 2, fig. 2, Pl. 3, fig. 3a,b:Knight et al. 1960: 1309; fig. 205, 4a,b.

MATERIAL EXAMINED. QMF33578, QMF33579 from QML1083.

DESCRIPTION. Large, low-trochiform shell up to 35mm high, 55mm wide; apical angle of 130°. Suture channelled with keel on abaxial margin, whorls embrace on upper whorl face. Upper whorl surface sloping and slightly concave, lower whorl surface rounded. Peripheral angulation at slightly above midwhorl. Aperture subrectangular. Base rounded, heavily abraded, with poorly preserved prosocline growth lines. Relicts of nodes preserved on periphery and on sutural keel.

TABLE 4. Measurements for *Gemininodosa langi* gen. et sp. nov.

Specimen	Height (mm)	Width(mm)	approx. apical angle (°)
QMF33611	14.2	11.0	75
QMF33608	14.6	16.4	115
QMF33638	16.3	13.9	95
QMF33641	14.4	14.1	90
QMF33642	13.5	10.3	135 (crushed)
QMF33644	12.2	10.9	90

REMARKS. The material is heavily abraded, lacking the basal ornament characteristic of the taxon, but it is otherwise indistinguishable from the holotype, and other material collected from the Burdekin Subprovince. A review of the higher taxonomy of this distinct gastropod is needed.

Superfamily MURCHISONIOIDEA
Koken, 1896
Family MURCHISONIIDAE Koken, 1896
Murchisonia D'Archaic & De Verneuil, 1841
Murchisonia (Murchisonia)

Murchisonia (Murchisonia) wandovalensis
sp. nov. (Fig. 7A-G)

MATERIAL EXAMINED. HOLOTYPE: QMF33680 from QML1092, Papilio Mudstone, Givetian, Broken River Province. PARATYPES: QMF33675-QMF33679, QMF33681-QMF33685, QMF34129-QMF34184, QMF34195-QMF34202 from L1092.

DESCRIPTION. Small, high-spired, turbiniform gastropod, up to 11mm high and 11mm wide (Table 5), with an apical angle of c. 55°. Suture impressed. Whorl profile angular with wide, midwhorl, peripherally placed selenizone bordered by prominent 2 spiral cords. Upper whorl face steep, slightly concave. Lower whorl face rounded, bearing a spiral cord 1/3 below the selenizone. Whorls embrace at this lowermost cord, just below the mid-whorl. Growth lines fine, numerous, collabral; concave in the selenizone; somewhat sinusoidal between the lower bordering cord of the selenizone and the spiral cord on the lower whorl face. Base rounded aperture subrounded with slit at midwhorl.

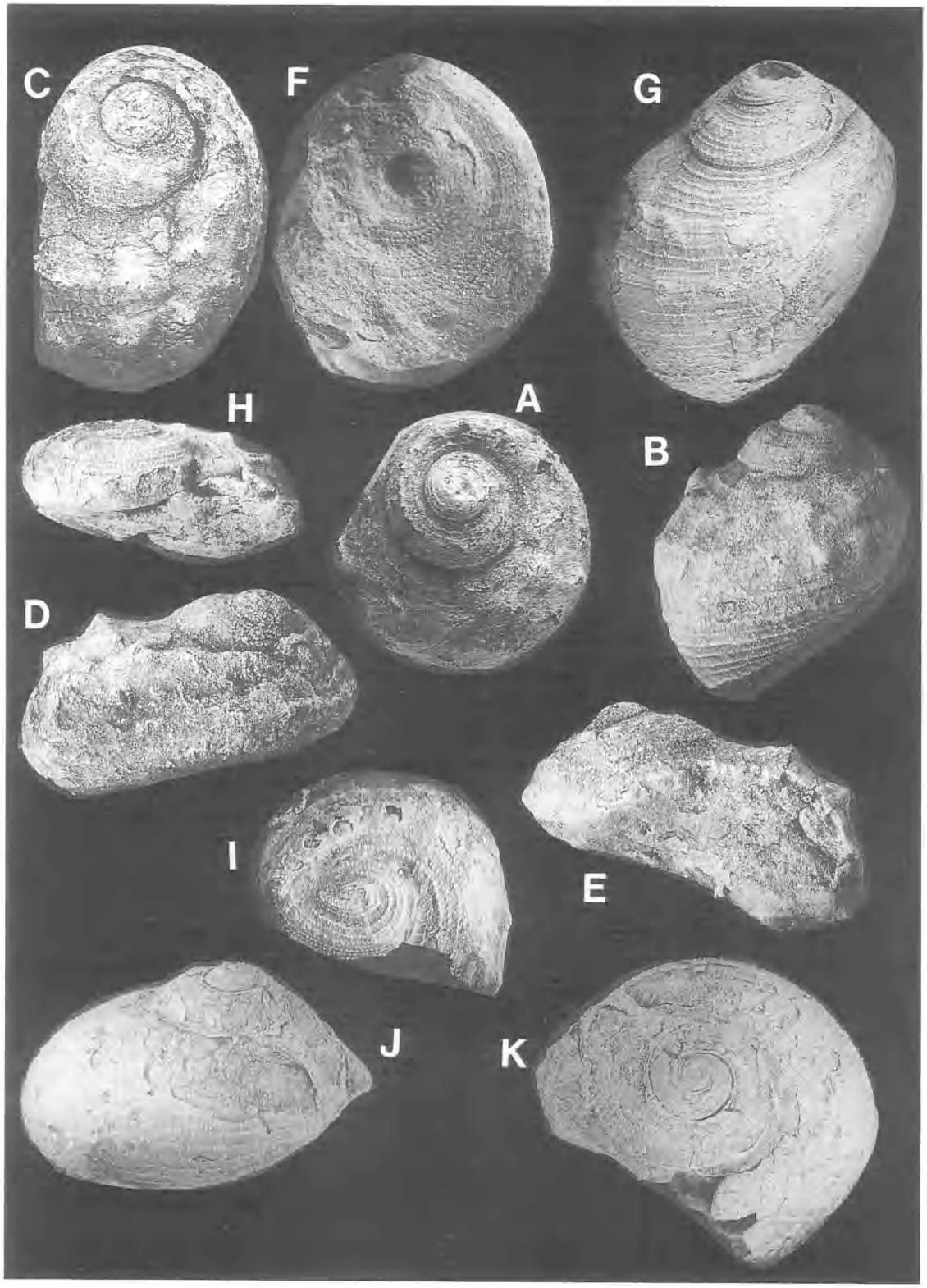
C
F
G
H
A
B
D
I
E
J
K

TABLE 5. Measurments for *Murchisonia (Murchisonia)*

Specimen	Height (mm)	Width(mm)
QMF33676	8.6	7.2
QMF33680	10.7	7.7
QMF33685	8.2	6.8
QMF34202	8.9	8.9

DIAGNOSIS. Small, somewhat turbiniform *Murchisonia (Murchisonia)*, with additional spiral cord on lower whorl face, just below selenizone.

REMARKS. The material is similar to *M.(M.) fermioni* Tassell 1982 from the Early Devonian *Receptaculites* Limestone, New South Wales, however *M. (M.) fermioni* has a more impressed suture and lacks the spiral cord on the lower whorl face. From other species of the subgenus it differs in the less high-spired form, and generally, the presence of the lower whorl face cord.

ETYMOLOGY. For Wandovale Station.

Murchisonia (Murchisonia) lawlessi sp. nov.
(Fig. 8 A-I)

MATERIAL EXAMINED. HOLOTYPE: QMF33704 from QML1019, uppermost Dosey Limestone, Givetian, Broken River Province. PARATYPES: QMF33089, QMF34258, QMF33096, QMF33345, QMF33347, QMF33393, QMF33700, QMF34263 from QML1019.

DIAGNOSIS. Medium-sized, high-spired member of subgenus, with ridge on upper and lower whorl faces, more prominent on upper, but not defining a distinct cord.

DESCRIPTION. Medium-sized, high-spired anomphalus gastropod, up to 18.4mm high, 12.0mm wide at base (Table 6) with an apical angle of approximately 22-30°. Whorl profile angular with peripheral selenizone bordered by two cords. Upper whorl face shallowly sloping with a low, rounded, spiral ridge, just below the suture. Suture impressed, whorls embrace well below midwhorl at lower spiral ridge. Selenizone narrow, located at midwhorl. Lower whorl face rounded and convex, with weaker ridge, slightly lower and wider. Base rounded, aperture rounded with slit at peripheral margin.

TABLE 6. Measurements for *Murchisonia (Murchisonia) lawlessi* sp. nov.

Specimen	Height (mm)	Width(mm)	approx. apical angle (°)
QMF33704	18.4	12.0	22
QMF33347	15.3*	7.6	22
QMF33700	16.5	11.0	25
QMF33345	17.6	9.4	30

REMARKS. The species is differentiated from other *Murchisonia (Murchisonia)* in the area by the ridge on the upper and lower whorl faces in addition to those bordering the selenizone.

Murchisonia (Murchisonia) turris de Koninck from the Early Devonian *Receptaculites* Limestone, New South Wales lacks the two additional ridges and is more high-spired. *Murchisonia (Murchisonia) anderdoniae* Linsley 1968, from the Middle Devonian Anderdon Limestone, North America, has a similar whorl profile and spire architecture, but is much smaller and lacks the upper and lower spiral ridges of *M.(M.) lawlessi*.

The material is superficially resemblant of *Ulrichospira kanekoi* Kase & Nishida from the Eifelian Nakazato Formation, Kitikami Mountains, Japan, but members of *Ulrichospira* have the selenizone high on the whorl, rather than midwhorl in this taxon.

ETYMOLOGY. For Phil Lawless.

Murchisonia (Murchisonia) sp. cf.
M.(M.) fermioni Tassell, 1982
(Fig. 7H,I)

MATERIAL EXAMINED. QMF33701, QMF34266, QMF33264 from QML1019.

DESCRIPTION. Small to medium-sized, turbiniform shell, up to 16.1mm high, 10.6mm wide, with a pleural angle of 35°. Whorl profile acutely angular, upper whorl face steep, lower flattened. Periphery at midwhorl bearing narrow selenizone bordered by 2 spiral threads. Suture impressed, whorls embrace slightly below selenizone. Base rounded. Aperture unknown. Growth lines fine, numerous, collabral, slightly opisthocline.

REMARKS. This species is separated from *M.(M.) wandovalenesis* by the lack of spiral or-

FIG. 6. A-I, *Gemininodosa langi* gen et. sp. nov. A,B. Holotype QMF33611, x 3.3. A, apical view; B, side view. C-E, Paratype QMF33642, x 3.7. C, oblique apical view; D, side view; E, apertural view. F,G, Paratype QMF33638, x 3.4. F, apical view; G, Side view. H,I, Paratype QMF32182 (crushed specimen), x 4. H, apertural view; I, apical view. J,K, Platyceratoidea gen. et sp. indet. QMF34224, x 3.7. J, Side view; K, apertural view.

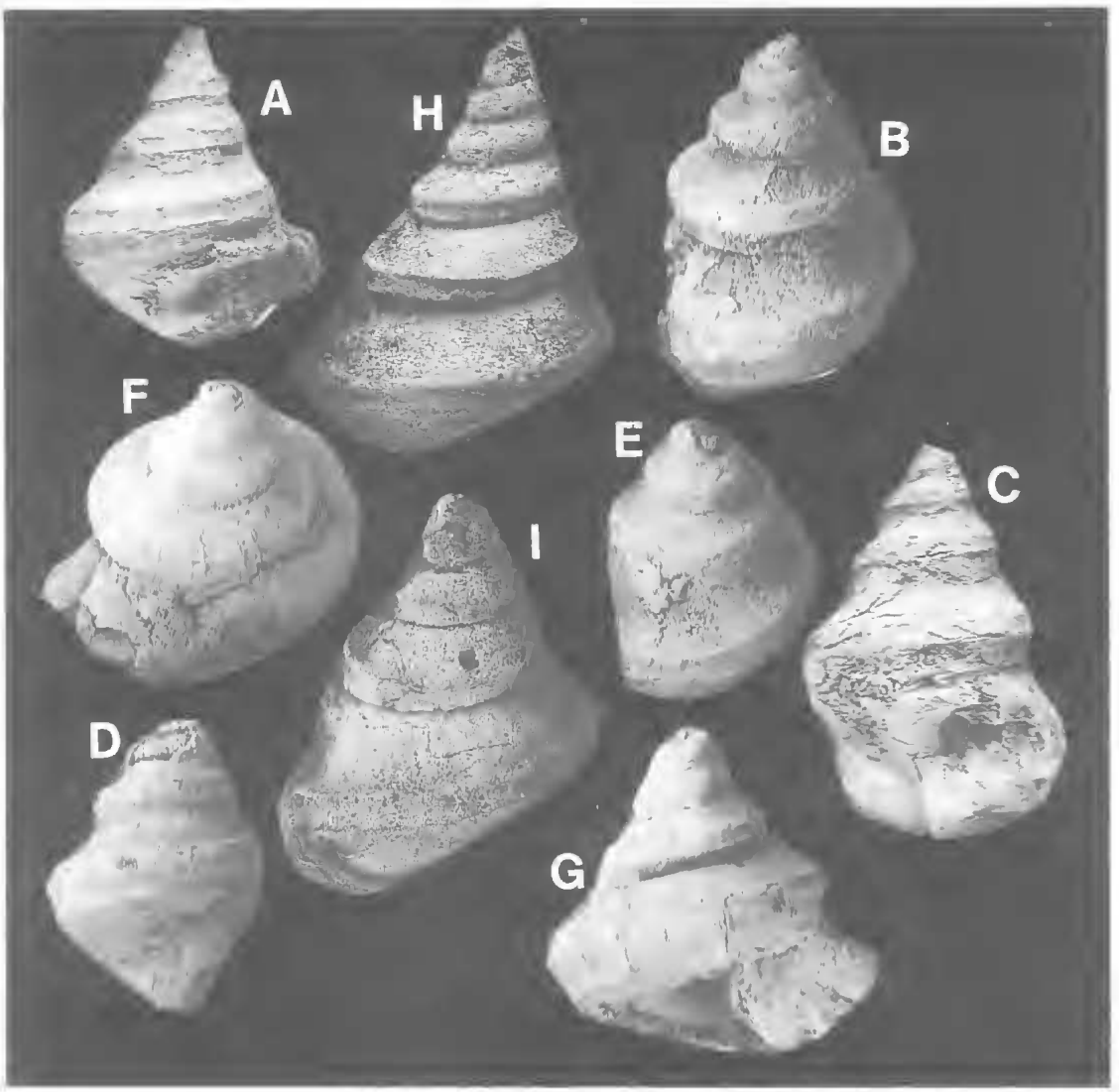

FIG. 7. A-G, *Murchisonia (Murchisonia) wandovalensis* sp. nov. A, Paratype QMF33676, apertural view x 5. B,C, Holotype QMF33680, x 4.7. B, side view; C, apertural view. D,E, Paratype QMF33685, x 4.5. D, apertural view; E, oblique side view. F,G, Paratype QMF34202 x 4.5. F, oblique side view; G, apertural view. H,I, *Murchisonia (Murchisonia)* sp. cf. *M. (M.) fermioni* Tassell, 1982. H, latex mould of QMF33701, x 3, side view. I, latex mould of QMF34266, x 3.5, side view.

nament additional to that bordering the selenizone and the more angular whorl profile. *Murchisonia (M.)* sp. is a higher-spired shell. The species is resemblant of *M.(M.) fermioni* Tassell, 1982 from the Early Devonian *Receptaculites* Limestone, New South Wales, but Tassell's taxon is slightly smaller, for this reason we tentatively refer the limited material to that taxon.

Murchisonia (Murchisonia) sp.
(Fig. 8J)

MATERIAL EXAMINED. QMF33686 from QML1019.

DESCRIPTION. Medium-sized, many-whorled, high-spired slender shell, 22mm height, 8mm basal width, with an apical angle 20°. Suture impressed with fine, weak, spiral ridges on the adjacent whorl surfaces. Whorl profile angular with peripheral,

midwhorl, concave selenizone bordered by prominent spiral cords of equal strength. Upper whorl surface begins flattened, thence is gently concave to periphery. Lower whorl face weakly concave. Base unknown. Growth lines unknown. Inner whorl surface rounded in cross-section, but aperture unknown.

REMARKS. The specimen closely resembles *Murchisonia (Murchisonia) akidota* Linsley 1968, from the Middle Devonian Anderdon Limestone, North America, but Linsley's taxon is much smaller, and has a more prominent spiral ridge on the lower suture, rather than weak lines above and below. Similarly *Murchisonia (Coelocaulis) procera* Oehlert 1888 from the Early Devonian of Saint-Germain-le-Fouilloux, France and *Murchisonia (Murchisonia) sculpta* (Perner, 1907) from the Late Silurian of Bohemia are larger and lack the ridges adjacent to the suture.

murchisoniid indet.
(Fig. 4A,B)

MATERIAL EXAMINED. QMF33097, QMF33100, QMF34259 from QML1019.

DESCRIPTION. Medium-sized, moderately high-spired, turbiniform gradate shell up to 28mm high and 20mm wide, with an apical angle of c. 30°. Upper whorl surface with prominent sutural ramp sloping very gently to peripheral rounded keel. Midwhorl surface wide and vertical, with selenizone bordered by 2 weak threads. Lower whorl face rounded, but poorly known in the material. Suture slightly impressed, situated at lower part of midwhorl surface. Base unknown. Collabral growth lines, fine, numerous, closely spaced, prosocline on sutural ramp and above selenizone, opisthocline below selenizone.

TABLE 7. Measurements for *Australoxa tasselli* gen. et sp. nov.

Specimen	Height (mm)	Width(mm)	approx. apical angle (°)
QMF33586	16.9*	8.6	20
QMF33587	18.0*	9.2	22
QMF33588	14.8*	6.5	19
QMF33589	16.9*	10.0	23
QMF33590	21.0*	11.5	25
QMF33708	16.8*	7.2	20
QMF33712	12.0*	5.7	20

REMARKS. Blodgett (pers. comm.) has examined photographs of this material and suggests that the Broken River specimens are congeneric with a new species of murchisoniid from north America. There is not enough material to confidently erect a genus or species.

Order CAENOGASTROPODA Cox, 1959
Superfamily LOXONEMATOIDEA Koken, 1889
Family LOXONEMATIDAE Koken, 1889
Stylonema Perner, 1907

Stylonema? sp.
(Fig. 10A)

MATERIAL EXAMINED. QMF33102 from QML1019.

DESCRIPTION. High-spired; many-whorled; small gastropod, 6.9 mm high; 1.4mm wide; apical angle sharp; approximately 12°; sutures grooved; sutural slope high; whorl profile rounded; aperture unknown; growth lines and sinus unknown.

REMARKS. Poor preservation and lack of material prevents assignment to species. The whorl profile and grooved sutures suggest reference to *Stylonema* but definite assignment awaits further material.

Australoxa gen. nov.

TYPE SPECIES. *Australoxa tasselli* sp. nov.

DIAGNOSIS. Medium-sized, high-spired; angular whorl profile; growth ornament of prominent opsithocline ribs. Angular periphery bears shallow but sharp sinus. Lower whorl profile with spiral cord.

REMARKS. The coarse ribbing suggests affinities to Palaeozygopleuridae, but the shallow sinus suggests placement within the Loxonematidae. The angular whorl profile is grossly suggestive of *Donaldiella*, but the growth parameters are significantly different for that genus as indicated by the differing growth lines. We place the genus in the Loxonematidae, but the genus appears intermediate between the two families and is derived from a time of great change in both.

ETYMOLOGY. Latin, Austral, southern, loxa, implying loxonematid affinifites.

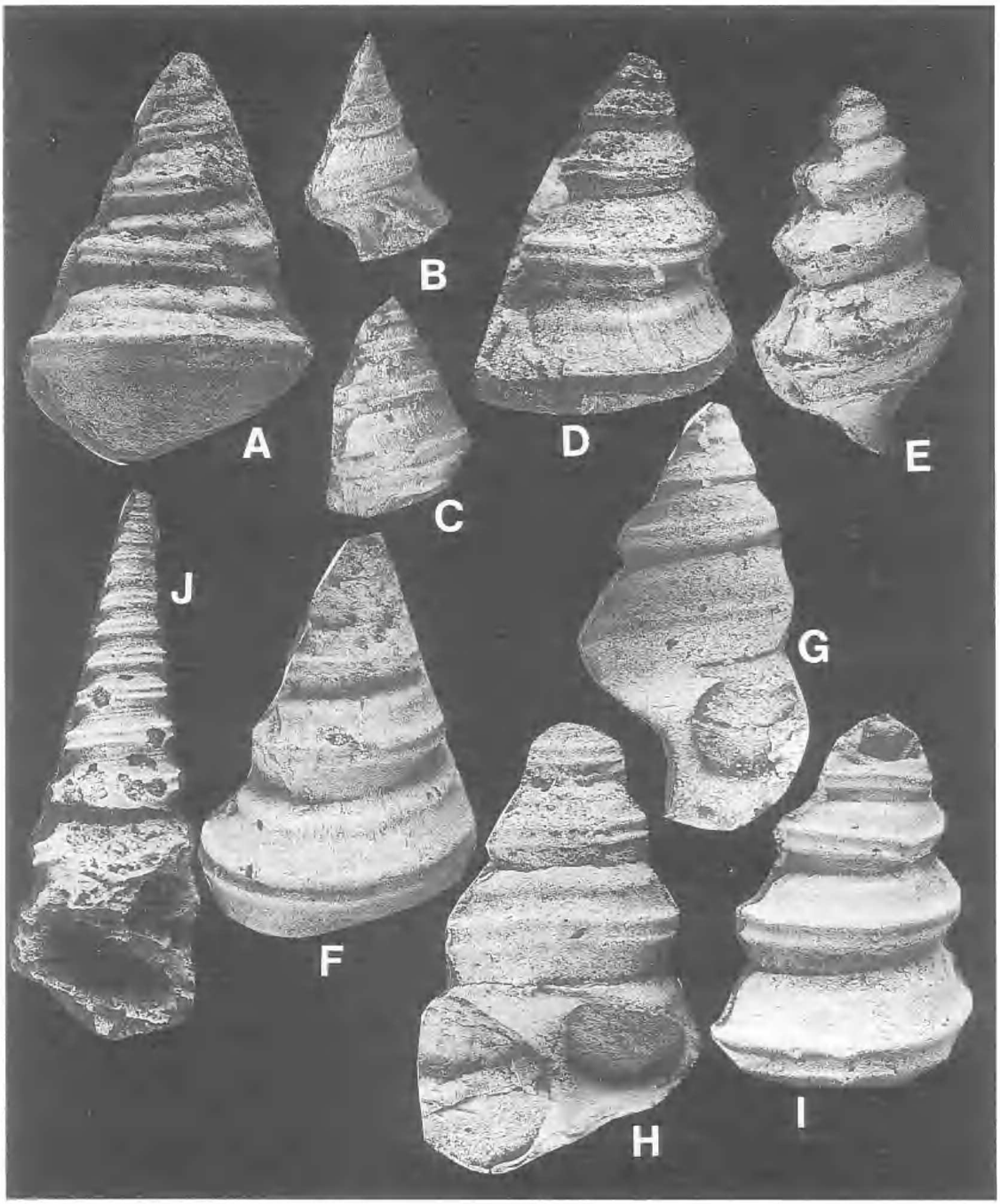

FIG. 8. A-I, *Murchisonia (Murchisonia) lawlessi* sp. nov. A, latex mould of holotype QMF33704, x 3.1, side view. B, latex mould of paratype QMF33092, apertural view x 4. C, latex mould of paratype QMF33095, x 3.5. D, latex mould of paratype QMF34260, side view x 3.6. E, latex mould of paratype QMF34258, x 3.5, side view. F, latex mould of paratype QMF33700, x 3.5, side view. G, latex mould of paratype QMF33096, x 3.6, apertural view. H, latex mould of paratype QMF33089, apertural view, x 4 last whorl abraded. I, latex mould of paratype QMF33707, x 4, side view. J, *Murchisonia (Murchisonia)* sp. QMF33686, x 3.5.

TABLE 8. Measurments for *Palaeozygopleura dodgeyi* sp. nov.

Specimen	Height (mm)	Width(mm)	approx. apical angle (°)
QMF33605	19.0	7.6	22
QMF33606	18.1	8.8	20
QMF33607	17.2	8.3	~20

Australoxa tasselli sp. nov.
(Fig. 9E-L)

MATERIAL EXAMINED. HOLOTYPE: QMF-33586, from QML1092, Papilio Mudstone, Givetian, Broken River Province. PARATYPE: QMF33587-QMF33603, QMF33708-QMF33711, from QML1092.

DIAGNOSIS. As for genus.

DESCRIPTION. Medium-sized, high-spired, anomphalous, up to slightly more than 22mm high, 12mm basal width, with a pleural angle of 19-25° (Table 7). Up to 7 whorls present in the material, but in general the apical whorls are missing. Whorl profile angular, with periphery slightly below midwhorl. Lower whorl face convex. Upper whorl face slightly convex to nearly flat with numerous strong opisthocline ribs which continue to the lower whorl face, only deflected at the periphery. Sinus expressed as a shallow, but sharp U-shaped deflection of the ribs on the peripheral angulation. A weaker spiral cord is present on the lower whorl face. Suture impressed; whorls embrace just below lowermost spiral cord. Base of holotype has subdued ribbing, otherwise, base rounded. Finer collabral growth lines preserved. Aperture unknown, but growth lines suggest it is rounded with a sharp, shallow invagination in the outer lip. Protoconch unknown.

REMARKS. This abundant taxon has the characteristic ribbing and angular whorl profile separating it from other loxonematids. There is superficial similarity to *Loxonema magnificum* Spitz, 1907 and *L. ingens* Frech from the Lower Devonian of the Carnic Alps. Both species are much larger, *L. ingens* lacks the angulation, having nodes instead and has finer ribbing. *L. magnificum*, whilst poorly preserved, shows relicts of nodes rather than a sinus-bearing angulation. Another superficially resemblant taxon is *Trochus? lamellosus* Lindstrom, 1884 from the Silurian of Gotland, but that taxon has a different whorl profile, a flattened base and is clearly not a loxonematid.

ETYMOLOGY. For Chris Tassell.

Loxonematidae indet.

MATERIAL EXAMINED. QMF32062 from QML541.

DESCRIPTION. Poorly preserved, large, many-whorled, high-spired shell, 35mm long, approximately 15mm wide at with an apical angle of c. 5-10°. Sutures impressed, sutural slope moderately high, approximately 15°. Coarse ribs suggested in the specimen, other external shell features not preserved.

REMARKS. Overall shape, sutural slope and impression suggests affinity to the Loxonomatidae Koken. The specimen resembles *Loxonema angelicum* d'Orbigny of de Koninck (1877, pl. 4, fig. 9), from the Early Devonian of New South Wales but is too poorly preserved for reliable comparison.

Family PALAEOZYGOPLEURIDAE
Horny, 1955
Palaeozygopleura Horny, 1955

Palaeozygopleura dodgeyi sp. nov.
(Fig. 9B-D)

MATERIAL EXAMINED. HOLOTYPE: QMF33604 from QML1092. PARATYPES: QMF33605-33607 from QML1092. QMF33620 from QML1090.

DIAGNOSIS. Small to medium-sized member of the genus, with thick opisthocyrt ribs.

DESCRIPTION. Small to medium-sized, high-spired gastropod which grew to slightly more than 19mm high and 7-9mm wide, with an apical angle of approximately 20° (Table 8). Base rounded, anomphalus; sutures impressed, whorl profile rounded with surface bearing numerous, thick, opisthocyrt ribs which extend from suture to suture, with a slight subsutural shelf on the uppermost whorl face. Finer collabral lines are present between rugae on QMF33620, not preserved on other specimens. Aperture not preserved, whorl profile and growth lines suggest that this was rounded, with broad sinus.

REMARKS. The species is smaller than, and lacks the change in rib spacing of *L. alticostatum* Tassell 1982 from the Early Devonian of New South Wales. *L. australis* (Cresswell) of Tassell (1978) is also similar, but has finer, more numerous ribs. The type species *P. alinae* (Perner) from the Lower Devonian of the Prague Basin, has finer ribbing, and is significantly smaller. This

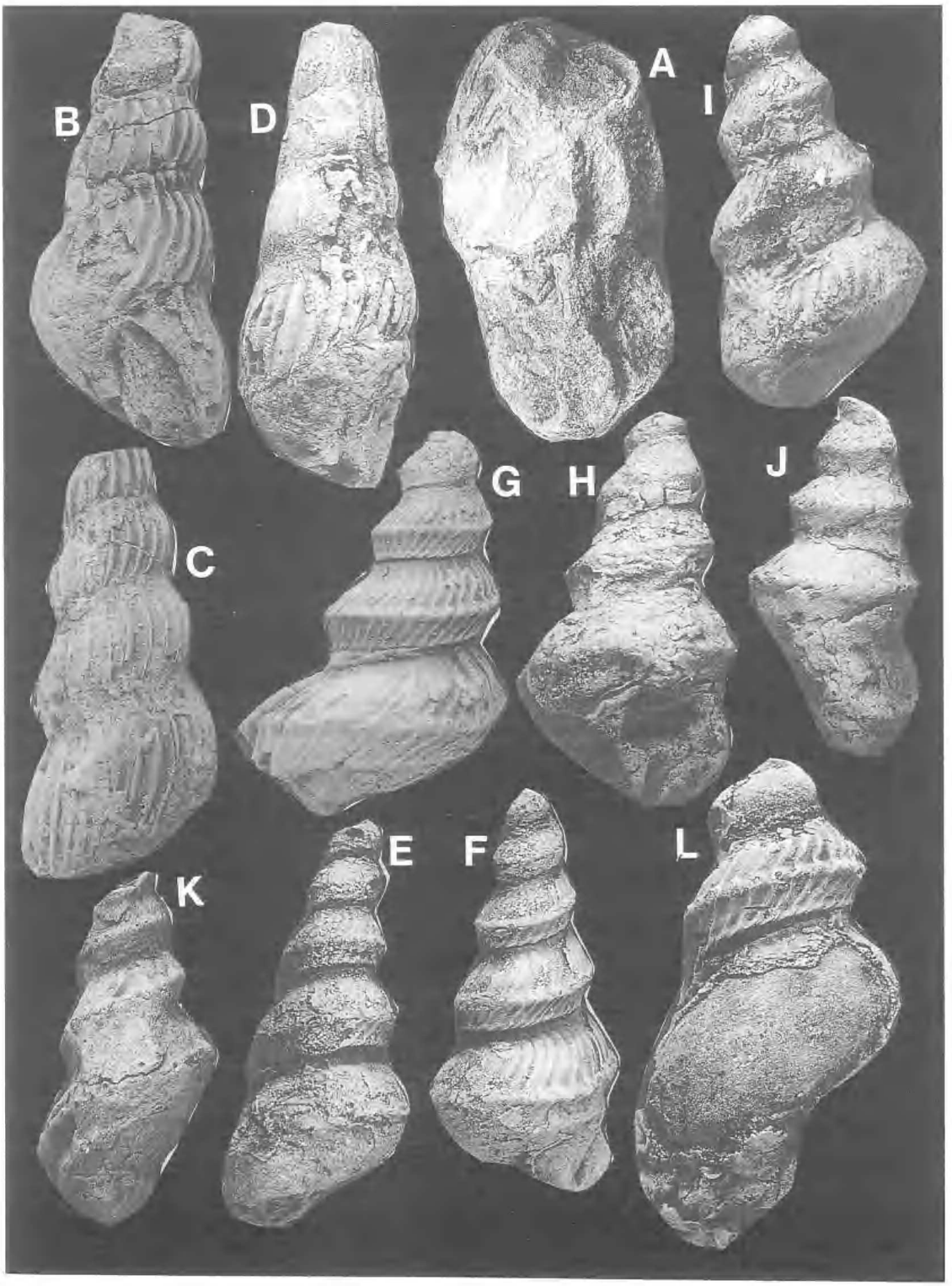
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TABLE 9. Measurements for *Leptogyma queenslandicus* sp. nov.

Specimen	Height (mm)	Width(mm)
QMF33673	7.7	5.7
QMF33674	7.5	6.4
QMF34204	6.0	6.6
QMF34209	5.9	4.8
QMF34213	6.3	5.7

species lacks the protoconch but is at the upper range of size diagnosed for the genus by Horny (1955). Both *P. sibleyense* Linsley and *P. joanni* Linsley from the Middle Devonian Anderdon Limestone of North America, are smaller, *P. joanni* has finer ribbing. *P. muoni* Tassell, 1982 from the *Receptaculites* Limestone of New South Wales lacks the prominent ribbing, and is smaller.

ETYMOLOGY. For Paul 'Dodgey' Tierney and Scott 'Dodgey' Hocknull.

Family PSEUDOZYGOPLEURIDAE Knight, 1930

PSEUDOZYGOPLEURIDAE gen. et. sp. indet. (Fig. 9A)

MATERIAL EXAMINED. QMF33584 from QML1089.

DESCRIPTION. The specimen is 2 whorls of a large, high-spired anomphalus shell. Basal width is 21.7mm, with the height of the 2 whorls 26.4mm. Whorl profile rounded; periphery slightly below midwhorl with the whorl surface dominated by thick, widely-spaced, slightly sigmoidal ribs. Suture impressed, embracing whorl slightly below periphery. Base somewhat conical. Preparation of specimen revealed no preserved fine growth lines. Shell moderately thick.

REMARKS. Given the large size and the prominent ribbing, the specimen belongs to the family, but cannot be further indentified. *Loxonema altacostatum* Tassell 1982 from the *Receptaculites* Limestone of New South Wales is similar, but its ribs are less sigmoidal.

Superfamily SUBULITOIDEA Lindstrom, 1884
Family SUBULITIDAE Lindstrom, 1884
Subfamily SOLENISCINAE Wenz, 1938

Soleniscus Bayle

TYPE SPECIES. *Soleniscus typicus* Meek & Worthen, 1861.

Solenisncus sp. cf. **Solensiscus subcostata** Schlotheim (Fig. 10 E,F)

MATERIAL EXAMINED. QMF33692-QMF33694 from QML1019.

DESCRIPTION. Medium sized, fusiform, up to 25mm high, 16mm wide, with an apical angle of c. 35°. Suture slightly impressed; whorls embrace slightly below midwhorl. Whorl profile rounded, periphery slightly above midwhorl. Surface ornamented by numerous sinusoidal growth lines. Aperture and base unknown.

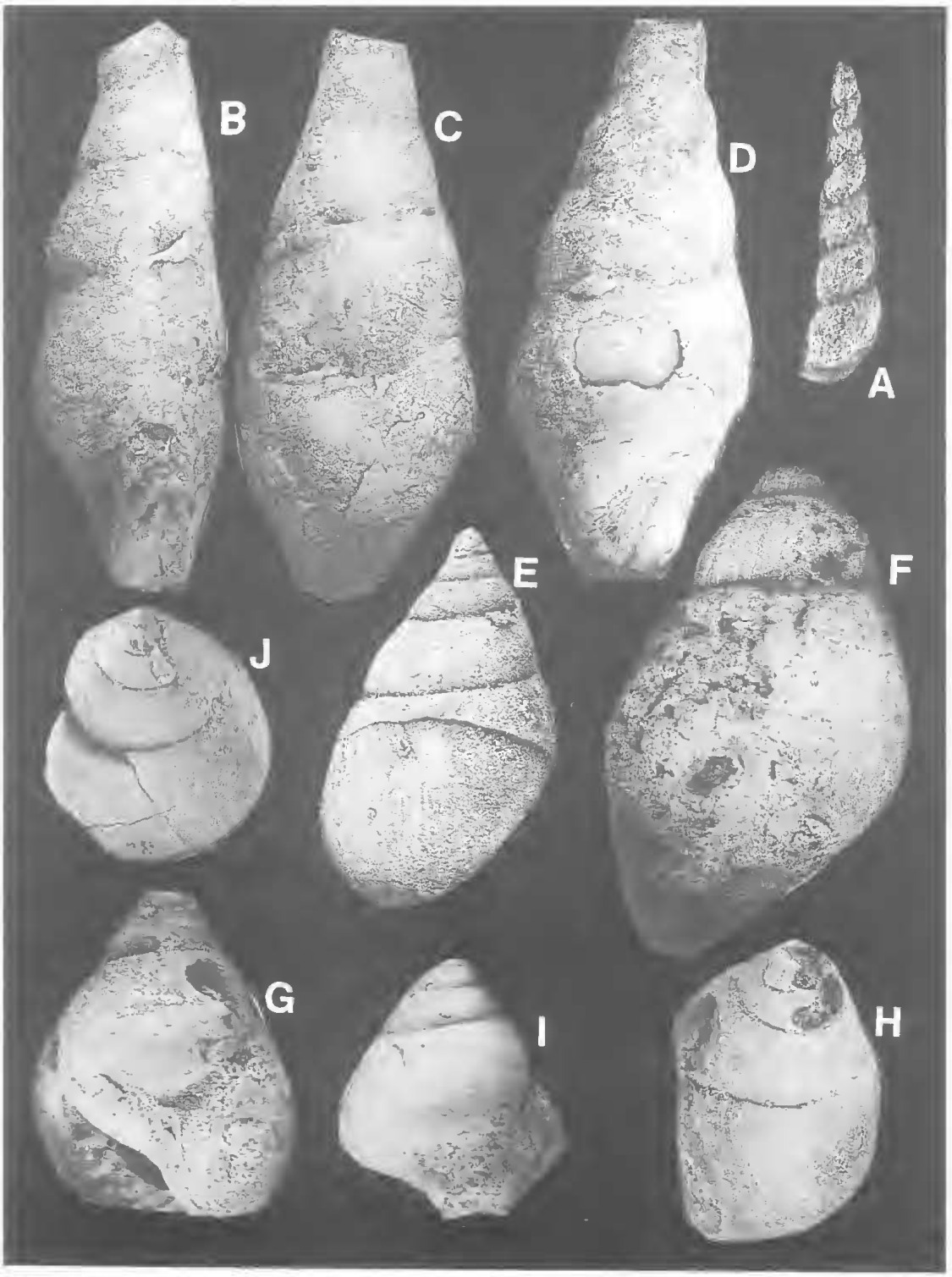
REMARKS. *Macrochilina* Bayle was placed in synonymy with *Soleniscus* Meek & Worthern by Knight et al. (1960) but forms ascribed to that genus have a generally squatter form than those given to *Soleniscus*. A strikingly similar, but much larger form is *Macrochilina arculata* Sclotheim of Mansuy (1912) from the Givetian of Yunnan. *Macrochilina subcostata* Schlotheim of Whidborne (1892) is of similar size and ornamentation and the Broken River material is referred to that taxon. Following Knight et al. (1960) both these taxa should be accommodated within *Soleniscus*. Perhaps separation of elongate and squat froms of the genus can be accommodated in 2 sungenera *Soleniscus (Solensiscus)* Meek & Worthen, and *Solensicus (Macrochilina)* Bayle.

Leptogyma queenslandicus sp. nov. (Fig. 10G-J)

MATERIAL EXAMINED. HOLOTYPE: QMF33673, from QML1092, Papilio Mudstone, Givetian, Broken River Province. PARATYPES: QMF33674, QMF34203-QMF34213 all from QML1092.

DIAGNOSIS. Small, turbiniform, *Leptogyma* with very fine growth lines and weak wide sinus.

FIG. 9. A, palaeozygopleurid indet. QMF33584, apertural view x 2.2. B-D, *Palaeozygopleura dodgeyi* sp. nov. B,C. Holotype QMF33608 x 3.5. B, apertural view; C, side view. D, Paratype QMF33607 side view x 3.5. E-L, *Australoxa tasselli* gen. et sp. nov. E,F, Holotype QMF33586, x 3.3. E, side view; F, apertural view. G, Paratype QMF33589, x 3.5 side view. H-J, Paratype QMF33708, x 3.6. H, apertural view; I, side view; J, side view. K, Paratype QMF33588, x 3.5, side view. L, Paratype QMF33590, x 3.1, side view.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DESCRIPTION. Small, turbiniform gastropod, up to 7.7mm high and 6.6mm wide (Table 9), apical angle c. 25°. Sutures slightly impressed, whorls join at periphery. Final whorl very large in proportion to earlier part of conch. Protoconch unknown. Whorl profile rounded, periphery below midwhorl, upper whorl face occupies 2/3 of profile. Growth lines very fine, numerous, closely spaced with a weak wide sinus. Base rounded. Columellar lip thickended, probable minor fold.

REMARKS. *Leptogyma* Knight, 1936 is separated from *Auriptogyma* Perner, 1903 by the thinner, unfolded columella in the latter. Thickening on the columellar lip confirms the generic identification. *Leptogyma australis* Tassell 1982, from the Early Devonian of New South Wales is higher spired than the Broken River material.

ETYMOLOGY. For the state of Queensland.

Family CODONOCHEILIDAE Miller, 1889
Mitchellia de Koninck, 1876

TYPE SPECIES. *M. striatula* de Koninck, 1876, from the limestone of the Yass District, New South Wales, by original designation.

DIAGNOSIS. See de Koninck 1877, or the 1898 translation.

DISTRIBUTION. Early Devonian (Emsian), *Receptaculites* Limestone, Taemas, New South Wales. The destroyed holotype specimen was from black argillaceous limestone from the Yass District, New South Wales and is most probably Early Devonian; Middle Devonian (Givetian) Papilio Formation, Broken River Province, north Queensland.

REMARKS. Knight et al. (1960) regarded *Mitchellia* as a junior synonym of *Scoliostoma* Braun, but as pointed out by Tassell (1982) the gerontic growth stage of the aperture is twisted downwards and, not upwards and is more constricted where it joins the main spire.

Mitchellia striatula de Koninck, 1877
(Fig. 10, B-D)

MATERIAL EXAMINED. QMF32643 from SD21.

DESCRIPTION. Medium-sized, high-spired, dextrally-coiled shell; early whorls not present in this specimen which is 38mm high and has 15mm maximum width. Apical angle is approximately 20°. Sutures moderately impressed; sutural slope approximately 15°. Whorl profile rounded, and rounded base. Aperture broken but, laterally constricted at final growth stage to an elongate oval shape. Ornament consists of more than 12 spiral threads. At final growth stage the threads are deflected downwards, indicating deflection of apertural growth.

REMARKS. The aperture is incomplete, broken at the point of deflection, but it is clearly constricted and the spiral threads show a marked downward deflection, identical to the more complete but smaller silicified specimens described by Tassell (1982). The specimen is at least double the size of those recorded by de Koninck (1876) and Tassell (1982), but is retained in the species due to the morphological equivalence.

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FIG. 10. A, *Stylonema*? sp. latex mould of QMF33102 x 7. B-D, *Mitchellia striatula* (de Koninck, 1876) QMF32643 x 2. B, apertural view; C-D, side views. E,F. *Soleniscus* sp. cf. *Soleniscus subcostata* Schlotheim. E, Latex mould of QMF33692 x 2. F, latex mould of QMF33693 x 3. G-J, *Leptogyma queenslandicus* sp. nov. G,H. Holotype QMF33673. G, apertural view x 6.3. H, oblique view x 6.3. I,J, Paratype QMF33213 x 6.3. I, apertural view. J, oblique view.

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